

## POTOMAC RIVER TIDEWATER LARGEMOUTH BASS FISHERY DISCUSSION 2014

### Summary

The tidewater Largemouth Bass fishery on the Potomac River has been the preeminent bass fishery in Maryland for many years because of its consistent quality, geographic scope, multiple access points, and the lack of restrictions on boat size and horsepower. In 2013, we had heard that fishing had been poor from several anglers, active guides, and tournament directors, which was supported by fall survey results from the MD DNR Tidal Bass Program. These indicators were supported by results of an on-line survey distributed by the Maryland Department of Natural Resources (DNR) via Facebook and Constant Contact. Sixty of the 100 respondents stated that fishing was not as good as usual in 2013. According to members of the Black Bass Roundtable, anglers blamed tournament angling, Northern Snakehead, Largemouth Bass Virus (LMBV), a lack of submerged aquatic vegetation (SAV), and MD DNR. To help determine if there was a problem with the Potomac River fishery, we tested several hypotheses: 1) there was a problem with reproduction; 2) there was a problem with fishing mortality; 3) there was a problem with disease; 4) there was a problem with catchability of bass by anglers; and 5) combination of two or more factors. There was evidence to support that there is a problem with the number of young bass entering the population. The MD DNR survey data indicate that the proportion of subadults (mainly ages-1 and -2), and indices of juvenile relative abundance and distribution have declined. Habitat conditions may explain changes because acreage of SAV, that protects young bass, has decreased since 2010 by about half within the tidewater portion of Potomac River. Anglers have similarly noted this decline, particularly near Woodrow Wilson Bridge. There is also some evidence to support an increase in fishing mortality between 2008 and 2010, though this does not appear to be related to increased levels of LMBV or other diseases. Greater fishing effort and catch rates of 2008 to 2010 may have led to greater handling stress and fishing mortality for Largemouth Bass, which could have also contributed to a change in catch for 2013. There was no support for greater levels of disease or LMBV infection directly causing a problem for fishing Largemouth Bass. The incidence of disease and prevalence of LMBV are not currently at levels cited as causing population declines for neighboring fisheries. Finally, there was some support that catchability of bass by anglers may have changed. As SAV has declined in acreage, it has also increased in density and likely congested adults into more restricted areas. Catch rates reported by tournament anglers between April and June were as high as they were in recent years possibly because bass were denser in fewer patches of SAV. After June, those catch rates declined to levels that were lower than those reported for corresponding months in 2009 and 2010. As summer progressed, it is possible that denser stands of SAV resulted in poorer fishing conditions. Dense monospecific stands of Hydrilla carpet areas, possibly impairing angling and shading out native SAV such as Wild Celery.

The MD DNR will consult with stakeholders to discuss this briefing document, record differing opinions, and consider those comments that are supported by data and observations. It is the intention of MD DNR to: implement research that informs the hypotheses above and to the extent resources allow; eliminate hypotheses that are not supported by the data and observations; for hypotheses that have not been eliminated, assess regulatory actions that can mitigate the problems and discuss these with stakeholders and the public; and continue to examine population

trends with current survey methods, but augment assessments by repeating historical assessments to compare decadal changes.

## POTOMAC RIVER TIDEWATER LARGEMOUTH BASS FISHERY DISCUSSION 2014

### The Problem

The tidewater Largemouth Bass fishery on the Potomac River has been the preeminent bass fishery in Maryland for many years because of its consistent quality, geographic scope, multiple access points and the lack of restrictions on boat size and horsepower. These attributes have attracted a large proportion of Maryland's bass tournaments and guides over the years. As the 2013 season progressed we started receiving reports of poor fishing. By the fall we had heard that fishing had definitely been poor from several anglers, active Guides and tournament directors. Logan Summers (tournament director, Fish On) noted that for 2014, "...we will most likely be scaling back our Potomac tournaments. Statistically, the 4 tournaments we held on the river this year were our worst 4 tournaments of the year." These anecdotes were supported from results of an on-line survey distributed by MD DNR via Facebook and Constant Contact. Approximately 60% of 100 respondents stated that fishing was not as good as usual in 2013. Likewise, annual indices of relative abundance from Maryland DNRs fishery independent monitoring have declined steadily since a peak in 2008 and in 2013 were well below the other low values in the 13 year time series.

In this document we explore the status of the bass fishery and population. To do that, we have evaluated a time series of several survey indices and their reference points listed in the Tidal Bass Program's Draft Fishery Management Plan (FMP) for Largemouth Bass. The fishery independent indices discussed here date to 1999 and exclude 2011 when fall electrofishing was not performed. Comparisons to indices prior to 1999 are not useful because of changes in methodology. We also offer hypotheses to help explain the changes in indices.

### Describing the Population with Selected Indices from the Draft FMP

The relative abundance of Largemouth Bass appears to have declined slowly for the past 5 years. Average catch per electrofishing hour of Largemouth Bass has declined since 2008 (Figure 1). The catch indices for 2012 and 2013 are the lowest of the 13 time series and below the Draft FMP biological reference point. Within the catch, the proportion of subadults (mainly ages 1 and 2) also appears to have declined since 2008. Because of the paucity of subadults, the percentages of Largemouth Bass from the 2013 survey that were  $\geq 12"$  (75%) and  $\geq 15"$  (35%) exceed the Draft FMP reference points. When these Draft FMP reference points are exceeded, it indicates that fewer subadults were collected than expected for a typical, balanced population.

The decline in average catch is related, in part, to the catch of juveniles, which has declined since 2008. Recent values of juvenile relative abundance (as Geometric Mean of Catch per Hour of Electrofishing) are low, but are similar to lows of 2002 and 2004 (Figure 2). In addition to average catch, the distribution of juveniles has contracted. The Proportion of Sites with Juveniles Present has declined since 2006 (Figure 3). The decline in relative abundance and distribution may be related to a decline in the relative abundance of small juveniles. Length frequencies of juvenile catches over the last 3 years show that small juveniles ( $< 120\text{mm}$ ) are becoming less abundant during the fall surveys.

The relative abundances of age 1 and age 2 fish have declined since a peak in 2008. Gear selectivity negatively biases the catch of age 1 in the survey and prevents the use of catch curve analysis to estimate mortality at early ages. However, if that bias is constant then annual ratios of catch by age do provide insight. The ratio of age 1 to age 0 has slightly decreased for 2008 – 2010 year classes, which indicates there has been a slight decrease in the proportion of survivors from age 0 to age 1. The slight decrease in survivorship may be related to increases in aspects of natural mortality, such as predation. Likewise, the ratio of age 2 to age 1 has only slightly increased for 2008 – 2010 cohorts, which generally reflects a decline in age 1 fish. Over all year classes (1999 – 2011) there has been no long-term decline in annual survivorship between ages 0 and 1, or ages 1 and 2.

The catch of older age classes of Largemouth Bass was assessed using data from fishery independent sources (i.e., Tidal Bass Survey) and fishery dependent sources (i.e., creel reports from tournament directors). The fishery dependent data account for Largemouth Bass reportedly weighed at the tournament and not the number of fish caught; so, these data are biased by both creel and size limit. As a result fishery dependant indices may not reflect changes in abundance until it reaches an unknown threshold.

Tidal Bass Survey data indicate that the catch per unit effort (CPUE) of age 3 fish (12” - 15” in total length) has declined since 2009. The CPUE of bass that were age 4+ (> 15” in total length) peaked in 2006, declined until 2012 when it slightly increased, and then declined to a time series low in 2013. In contrast, tournament creel reports indicate that the average catch of fish per angler-hour for the 12” and 15” seasons has been increasing over time and has been similarly high ever since 2008 and 2009, respectively. None-the-less, several tournament directors complained of unusually poor fishing and suggested that they might relocate their events to another system next year. There was a period (April – June) in 2013 when average catch rates for tournaments were greater than the rest of the year. Tournament anglers or recreational anglers who fished after June may have had worse fishing experiences than those who fished between April and June.

The opposing trends for the fishery dependent and independent data make conclusions less certain. However, the biases in angler data such as preferential choice of habitat makes it less suited to evaluating trends in river-wide population size than the Tidal Bass Survey, which uses a stratified, randomized experimental design. The fishery independent data tend to indicate an emerging problem with either recruitment or survivorship of fish. However, the relatively high catch rates of tournament anglers during some months indicate that adult fish remain at reasonably good numbers in the river.

#### Identifying a Problem with Reference Points from Draft FMP

The indices as described in the Draft FMP currently deviate from reference points for relative abundance of total catch, juvenile catch, and PSD. As described in the Draft FMP, the indices may be expected to fall outside the reference points for 2 – 3 years within a 10 year period due to sample error. However, deviating from reference points for consecutive years is stronger evidence that there may be a problem with the fishery. That condition calls for thorough evaluation of the data and perceived problems for which this discussion is the first step.

## Hypotheses to Explain Deviations from Reference Points

### *Hypothesis 1: Lower recruitment is negatively influencing the size of the spawning stock*

Changes in juvenile indices and the decline in the relative abundance of age 1 and age 2 Largemouth Bass may suggest poor recruitment, leading to fewer age 2 and age 3 bass to be caught by anglers. While the proportion of survivors between ages 0 and 1 (or 1 and 2) does not appreciably vary over time, a decline in the overall number of juveniles produced during a year might explain currently observed patterns related to juvenile relative abundance and distribution. These changes are likely related to habitat changes rather than the biomass of the spawning stock. Largemouth Bass populations typically exhibit weak stock-recruitment relationships because the number of adults is not predictive of the number of offspring. Instead, environmental factors strongly influence survivorship of offspring throughout the first year of life. Because the juvenile indices are measured during fall, the indices reflect patterns in survivorship of young bass from the nest through summer. Habitat conditions that could change among years and influence recruitment patterns include: submerged grass distribution (SAV) coverage and density; stream flow regime; weather conditions; and the expansion of invasive species such as Blue Catfish and Northern Snakehead.

Northern Snakehead is thought by anglers to pose a threat to Largemouth Bass as both a predator and competitor. While harvest or euthanasia of caught Northern Snakehead may not be accomplished every time the fish is caught, the species is generally harvested, regarded as a nuisance by anglers, as well as considered a good food source.

The acreage of SAV within tidewater of Potomac River has decreased since 2010 by about half (Figure 4). Concurrent with the reduction in grass coverage, there has been a steady increase in average density of SAV since 2008. As these grass conditions change, they may impact survivorship of young bass by: 1) reducing available habitat for spawning success; 2) reducing refugia of young bass and increasing their susceptibility to predation. While there can be many predators of young Largemouth Bass (including adult Largemouth Bass), the expansion and increase in biomass of Northern Snakehead and Blue Catfish increases predation risk.

### *Hypothesis 2: Increased fishing pressure is reducing survivorship*

Over the last decade the number of tournament angler-hours peaked in 2007-2009 but then decreased by at least 1/3<sup>rd</sup> in the 2011-2013 seasons. However, catch rates per angler have been relatively high and consistently so since 2008 (Figure 5). In the peak of angling effort (2007 – 2009) it is likely that more adults were weighed in than currently, when there is less angling effort. It is possible that handling stress during 2007 – 2009 led to greater levels of fishing mortality. Handling stress may be exacerbated during summer and for Largemouth Bass that carry LMBV. For example, in early summer of 2009, a large number of Largemouth Bass had been caught by tournaments and subsequently died in Mattawoman Creek (unpubl. data, Joseph Love, MD DNR Inland Fisheries). Modeling work for Potomac River has generally demonstrated that current levels of fishing mortality are sustainable for the fishery (work in press, Joseph Love, MD DNR Inland Fisheries). However, greater levels of fishing mortality (or reduced recruitment) can lead to greater chances of population declines.

### *Hypothesis 3. Disease is significantly reducing survivorship*

In the case of LMBV outbreak at Kerr Lake, VA in 2010, a decrease in older Largemouth Bass was noted by both anglers and survey teams. It took longer to catch older Largemouth Bass as well. The current Potomac River indices indicate that the relative abundance of old Largemouth Bass has declined, but was preceded by declines in young fish and catch rates by tournament anglers have changed little (on average).

Biologists with VA GIF noted a 40% prevalence of LMBV among fish tested at Kerr Lake. In Potomac River (2010), 4 of 20 (20%) tournament caught bass tested positive for LMBV. In 2011, 1 of 5 (20%) tested positive for LMBV. Thus, there is a lower prevalence of LMBV infected fish in samples taken from Potomac River than those taken from Kerr Lake. The LMBV has also been detected in the upper Chesapeake Bay and eastern shore rivers. It has not been implicated in fish kills from any of those systems. Additional testing of the virus is planned for August 2014.

The occurrence of the virus does not indicate the fish will become diseased. The disease from LMBV can manifest itself when the fish is physiologically stressed. To date, the rate of anglers reporting Largemouth Bass with symptoms of the disease from Potomac River has not changed appreciably. A recent survey (November 2013) of 100 anglers who fished the Potomac River in 2013 indicated that most (69%) observed about the same or healthier Largemouth Bass. Likewise, the Tidal Bass Program noted only 4.5 % of Largemouth Bass collected in 2012 had any signs of disease during surveys.

### *Hypothesis 4. Habitat conditions are negatively affecting catchability by anglers*

Potomac River habitat suitability indices are among the highest of tidewater habitats of the Chesapeake Bay watershed according to the Draft FMP. However, these indices can change monthly and differ among tributaries within Potomac River. Thus, catchability of Largemouth Bass can likewise differ monthly and among tributaries.

The distribution of grasses, a factor strongly influencing catchability as well as survivorship and growth of several age classes, declined from 12,149 acres in 2008 to 5815 acres in 2012 (data from Virginia Institute of Marine Science). In concert with changes in coverage, the density of grasses has increased from an average rank of 2.9 (in 2008) to 3.5 (in 2012). Therefore, the reduction in grass coverage and increasing density may have acted together to help explain fewer anglers catching Largemouth Bass if grass conditions affect catchability of Largemouth Bass.

### *Hypothesis 5. Two or more hypotheses are appropriate*

Three of the aforementioned hypotheses are currently supported by data and can explain trends currently observed for the Potomac River bass fishery. These are hypotheses 1, 2, and 4. Additional work to exclude hypothesis 3 is on-going (see below). Work to exclude one or more remaining hypotheses may occur in 2014, depending on available resources (see below).

## Next Steps

1. Consult with stakeholders to discuss this briefing document; record differing opinions and consider those that are supported by data and observations.
2. Eliminate potential hypotheses that do not explain deviations from reference points.
3. Implement additional research, as resources allow, to discern among the hypotheses. This research can include: 1) assess the relationship between juvenile distribution and SAV using available datasets; 2) measure fish mortality during tournaments and work with anglers to reduce handling stress; 3) assess prevalence of LMBV; and 4) monitor tournament angling effort and catch rates to compare those catch rates with ones collected from non-tournament anglers during creel surveys.
4. Assess which regulatory actions are most likely to mitigate problems identified by hypotheses, and obtain input on potential regulatory ideas with stakeholders.
5. Continue to examine population trends with current survey methods. Augment assessments by repeating early methods to compare decadal changes.

Figure 1. Data from the MD DNR Tidal Bass Program's Survey of Largemouth Bass from Potomac River since 1999. In 2011, no survey was conducted. Points are average catch per electrofishing hour across 31 – 55 sites surveyed within Maryland's portion of tidewater habitats each year.

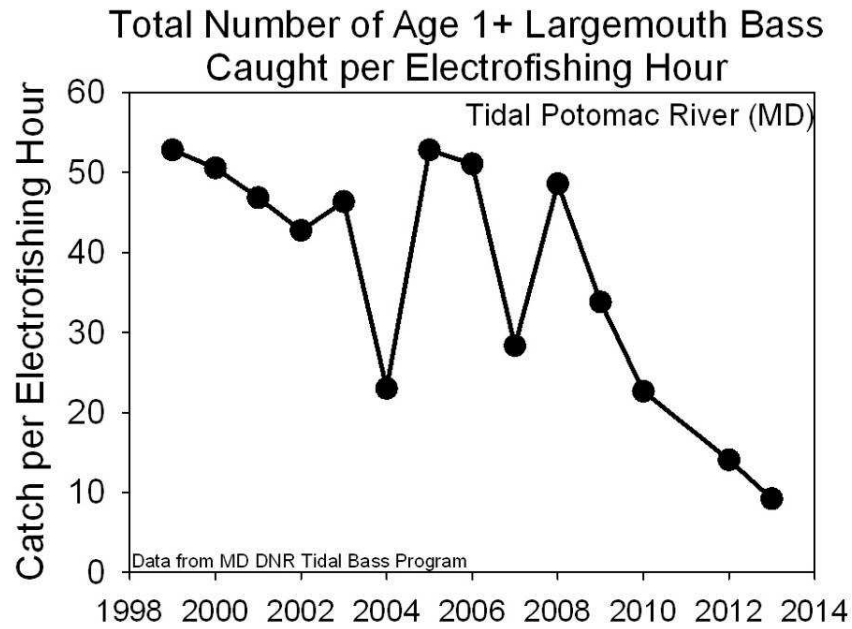


Figure 2. Data from the MD DNR Tidal Bass Program's Survey of Largemouth Bass from Potomac River since 1999. In 2011, no survey was conducted. Points are average catch per electrofishing hour across 31 – 55 sites surveyed within Maryland's portion of tidewater habitats each year. Averages are geometric means that include sites where juvenile Largemouth Bass was collected.

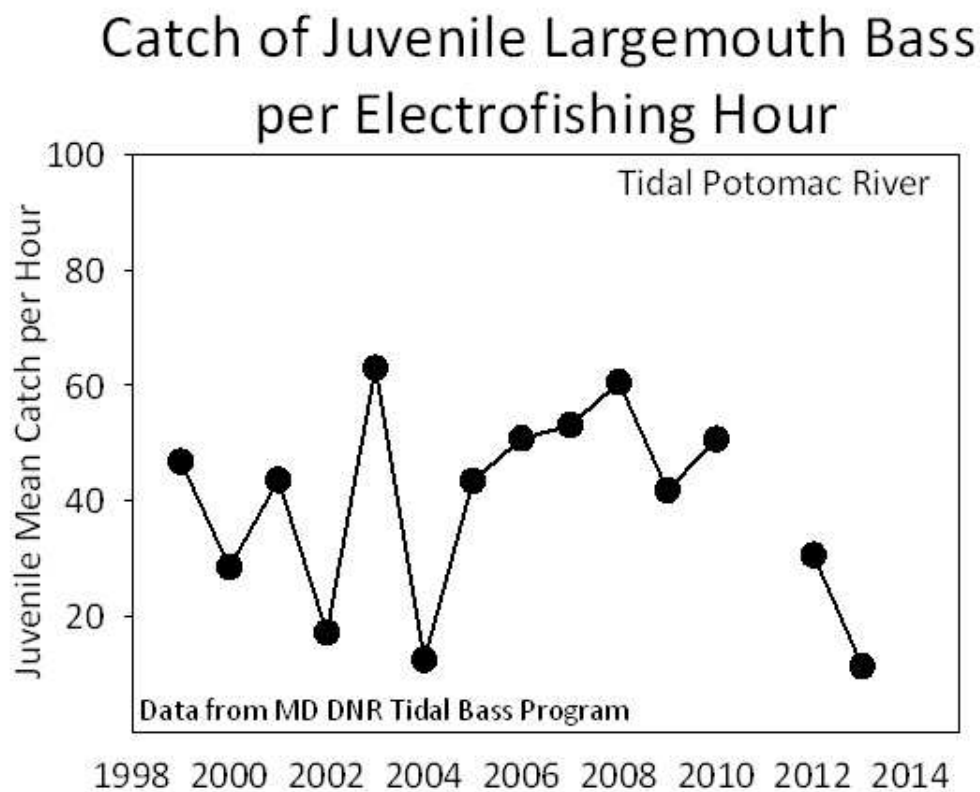


Figure 3. Data from the MD DNR Tidal Bass Program's Survey of Largemouth Bass from Potomac River since 1999. In 2011, no survey was conducted. Points are proportion of prime (and average or good quality) sites where juvenile Largemouth Bass was collected. The number of surveyed good quality sites has varied among years between 24 and 45 within Maryland's portion of tidewater habitats each year.

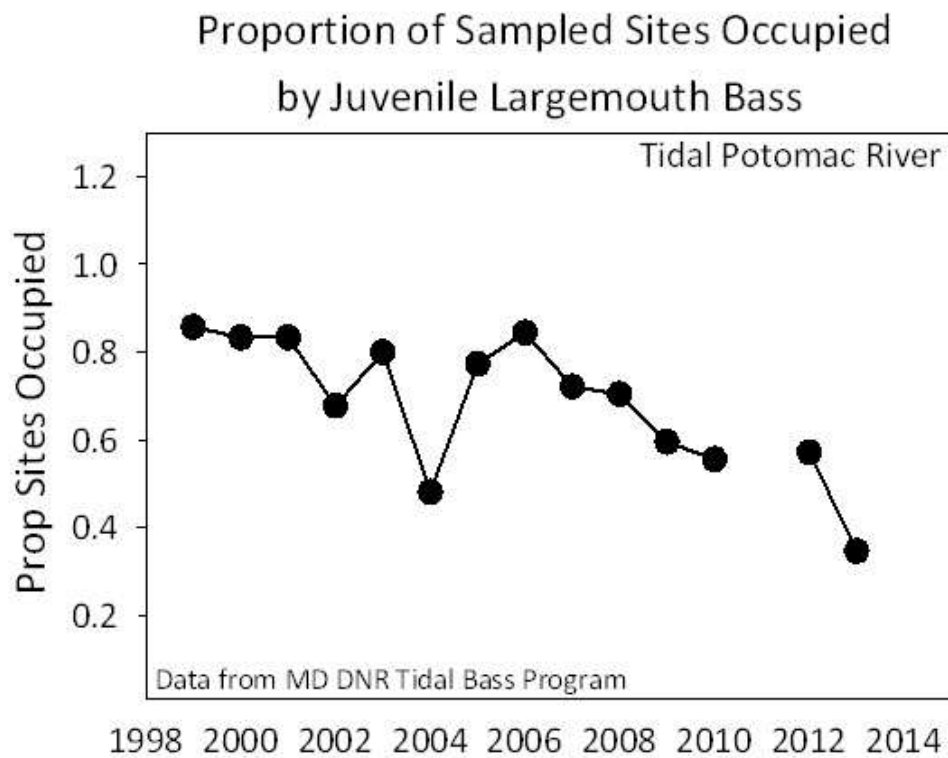
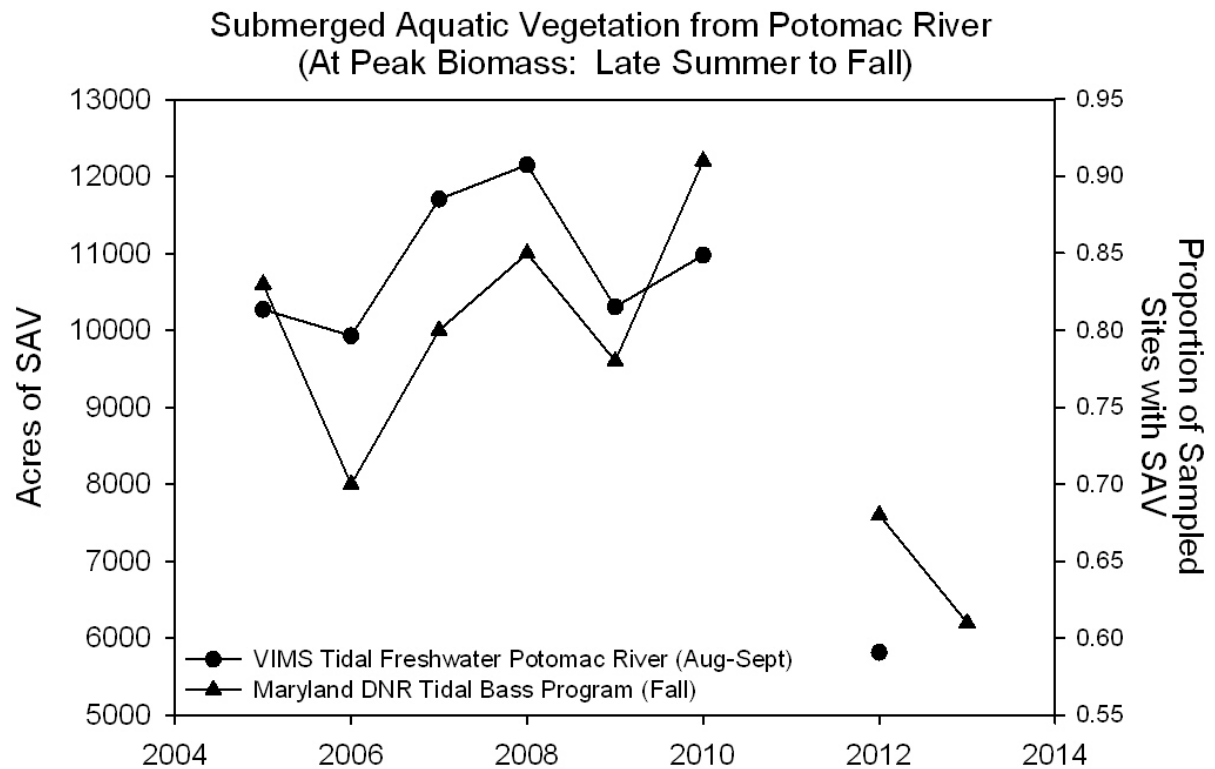


Figure 4. Data from Virginia Institute of Marine Science's aerial coverage of submerged aquatic vegetation from Potomac River since 2005. Points are acres of SAV calculated for a defined area enveloping the Maryland and Virginia sides of tidewater habitats (Route 301 Bridge and upstream to Smoots Bay). For comparison, the proportion of sites surveyed by MD DNR Tidal Bass Program during fall with SAV is also provided.



Reported Catch from Black Bass Tournament Anglers in 2013  
(Potomac River)

